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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/671,346

09/24/2003

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088245-0108

7074

23524 7590 11/18/2009

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EXAMINER

BURD, KEVIN MICHAEL

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

11/18/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/671,346	Applicant(s) BORRAN ET AL.	
	Examiner Kevin M. Burd	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 41,42,45-50,53-58 and 61-78 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 41,42,45-50,53-58,61-78 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. This office action, in response to the request for continued examination and the amendment filed 11/10/2009, is a non-final office action.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/10/2009 has been entered.

Response to Arguments

3. Applicant's arguments have been fully considered. As stated in the advisory action mailed 10/9/2009, De Gaudenzi discloses the selection of the radii to precompensate for distortion. The appropriate radii will be selected to correspond to the level of predistortion necessary. The selected radii and the angle define the constellation. De Gaudenzi does not expressly disclose storing all of the available constellations. The reference will determine the appropriate radii and angle and the corresponding constellation (such as the constellation shown in figure 1) will be used. Storing data in a storage medium so computations are minimized during the operation of a device is well known in the art of communication. Olafsson discloses a communication system where optimized signal point constellations are derived and a

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constellation is selected from a group of predetermined constellations (column 10, lines 13). Any number of constellations can be stored (column 10, lines 18-20). The rejections of the claims using this additional reference with the previous combinations are stated below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 41, 42, 45, 49, 50, 53, 57, 58 and 61-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Gaudenzi et al (US 2006/0209982) in view of Dabak et al "Signal Constellations for Non-Gaussian Communication problems" Statistical Signal and Array Processing. Minneapolis, April 27-30 1993. Proceedings of the International Conference on Acoustics, Speech, and signal Processing (ICASSP), New York, IEEE, US, VOL. 4, pages 33-36 further in view of Olafsson (US 6,023,493).

Regarding claims 41, 42, 45, 49, 50, 53, 57, 58 and 76-78, De Gaudenzi discloses a method and apparatus for transmitting a signal. A nominal signal to noise ratio for transmitting the digitally modulated signal is determined (claim 1). A stream of modulated symbols are generated (claim 1) according to amplitude and phase shift keying coded modulation (abstract). A signal constellation is chosen so as to maximize a minimum geometrical distance between the pairs of points of the digital constellation

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(claim 1). The modulated symbols are then transmitted to the receiver (figure 11). De Gaudenzi does not disclose the method and device determines the distance between the constellation points as a function of a Kullback-Leiber distance. However, Dabak discloses a method of computing optimum signal sets (abstract). By optimizing the constellation points for non-Gaussian communication problems, the problems can be overcome and proper communication between users can be achieved. This optimization is achieved since the Kullback information can be used to express how performance varies with noise amplitude distribution and with signal set choice (III). Additional information regarding the Kullback information is provided in heading II. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Dabak into the method and device of De Gaudenzi for the reasons stated above. The combination does not expressly disclose storing all of the available constellations. The combination will determine the appropriate radii and angle and the corresponding constellation (such as the constellation shown in figure 1 of De Gaudenzi) will be used. Storing data in a storage medium so computations are minimized during the operation of a device is well known in the art of communication. Olafsson discloses a communication system where optimized signal point constellations are derived and a constellation is selected from a group of predetermined constellations (column 10, lines 13). Any number of constellations can be stored (column 10, lines 18-20). Particular signal point constellations are stored in database 510 for subsequent use during encoding (column 10, lines 37-40) so the modem system need not individually determine new signal point constellations for each transmit session (column 10, lines

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25-27). Each of the constellations are already determined and stored in the memory.

The constellations are optimized in accordance with any number of factors including any other known sources of digital impairments (column 10, lines 17-24). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teaching of Olafsson into the combination of De Gaudenzi and Dabak to provide this simple substitution of the determining and selecting of the signal constellation with the selecting and accessing of the signal constellation of Olafsson since the circuit will operate in substantially the same manner and will yield the same result. In addition, the combination will have the added benefit of reducing computations when the system is active since the modem system need not individually determine new signal point constellations for each transmit session.

Regarding claims 61-75, the combination disclosed the claimed limitations. Claim 1 of De Gaudenzi recites mapping the modulation symbols where the signal constellation comprising a number of digital signal points equally spaced on at least two concentric rings having respective predetermined radii, where the ratio of the radii of the concentric rings is chosen so as to maximize the minimum geometrical distance between pairs of points of the digital signal constellation. Dabak discusses the Kullback information.

5. Claims 46-48 and 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Gaudenzi et al (US 2006/0209982) in view of Dabak et al "Signal Constellations for Non-Gaussian Communication problems" Statistical Signal and Array

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Processing. Minneapolis, April 27-30 1993. Proceedings of the International Conference on Acoustics, Speech, and signal Processing (ICASSP), New York, IEEE, US, VOL. 4, pages 33-36, further in view of Won (US 7,269,436) further in view of Olafsson (US 6,023,493).

Regarding claims 46-48 and 54-56, the combination of De Gaudenzi, Dabak and Olafsson discloses the method and apparatus stated above in paragraph 4. The combination does not disclose the number of transmit antennas is determined from a message received over the wireless channel. Won discloses the transmitter can estimate the channel covariance matrix using a preamble transmitted from the receiver. The transmitter can also update the number of antennas and the power allocation according to the eigenvalues of the estimated covariance matrix (column 7, lines 42-48). Therefore, the number of transmit antennas is determined from the information in the preamble (header) of the received signal. Won discloses transmitting information from the antennas. The signal constellation of the combination is selected based on the modulated transmitted signal. Therefore, the selecting of the signal constellation is based (dependent on) a number of transmit antennas used to transmit the signal. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teaching of Won into the method and apparatus of the combination of De Gaudenzi, Dabak and Olafsson. Controlling the number of antennas used according the channel conditions will minimize the power consumed by the transmitter, reducing the cost of operating the transmission system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Friday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin M. Burd/
Primary Examiner, Art Unit 2611
11/16/2009